

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
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RELEASE OF TWO EARLY FLOWERING INDICA MUTANTS OF RICE

The Agricultural Research Service, US Department of Agriculture announces the release of two indica mutants of rice (*Oryza sativa* L.), indica-14 and indica-15. These two lines are induced early flowering mutants from two International Rice Research Institute (IRRI) germplasm lines which approach US grain quality standards. The IRRI lines themselves are too late in maturity for US conditions, so the present early flowering mutants were induced. These two mutants are part of a base-broadening effort to develop indica germplasm suitable for US rice, where very narrow genetic bases, essentially all japonicas, have evolved because of need for adaptation to temperate climate and to specific grain quality requirements. Thus long grain cultivars in the US are tropical japonicas that have such specific grain quality requirements that infusions of germplasm from indica sources usually have been limited to individual characters such as semidwarfing and disease resistance, followed by backcrossing to the japonica parent to recover satisfactory grain quality. The two present indica mutants, and their respective indica parents, have grain shape and amylose contents similar to US long grain japonica cultivars. The mutants are 11 and 23 days earlier than their indica parents, and are 9 and 26 days later than a prominent japonica check cultivar. These two, together with four previously released early flowering indica mutants of two other IRRI rice germplasms, provide useful sources of indica diversity for US rice improvement programs.

The lines were derived by gamma radiation of IRRI germplasm lines IR65629-67-3-3-1-1-2 and IR60864-88-1-1-1-2, abbreviated henceforth as IR65629 and IR60864, respectively, provided by G.S. Khush of IRRI (personal communication, December 29, 1995). The IRRI materials have grain quality characteristics similar to US long grain cultivars but are about one month later in maturity than is desired in the US.

Seeds of the two IRRI germplasms were gamma-ray mutagenized in late 2000 with 250, 300, and 350 Gy. The M1 generation was grown in the 2000/01 Puerto Rico nursery. Approximately 1000 M1 panicles were taken from the 250 and 300 Gy treatments; fewer panicles were taken from the 350 Gy treatment which had reduced M1 plant viability. The unthreshed M1 panicles were planted in 2001 at Stuttgart, in hills about 40 cm apart in 30 cm wide rows. Single early flowering panicles were taken from M2 hills observed to be segregating for flowering time. Twenty-one M2 selections were made from IR65629 and nineteen from IR60864. These lines were successively narrowed down and advanced in subsequent winter and summer nurseries, to the M7 generation in 2004, when they were yield tested at Stuttgart, in six-row plots, 5.1 m long and 0.3 m row width with 56 kg ha⁻¹ of nitrogen fertilizer applied preflood. The two center rows were harvested. The tropical japonica long grain cultivar Francis (PI 632447 PVPO) was included as a check. Agronomic data and amylose contents were determined on the 2004 crop.

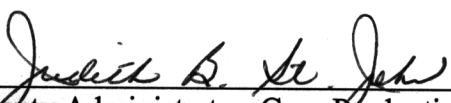
The check cultivar flowered in 94 days after planting, was 98 cm tall, yielded 8080 kg ha⁻¹, had 69% whole-grain milling yield, and 233 g kg⁻¹ amylose in the milled rice. Brown rice length was 7.4 mm, and 1000 kernel weight was 20.1 grams. Indica-14, derived from IR65629, flowered in 103 days, was 106 cm tall, yielded 7930 kg ha⁻¹, had 60% whole grain milling yield, and 239 g kg⁻¹ amylose. Brown rice length was 7.9 mm, and 1000 kernel weight was 24.4 grams. Indica-14 was 23 days earlier than its parent, indicating successful induction of earlier maturity.

Indica-15, derived from IR60684, flowered in 120 days, was 116 cm tall, yielded 8220 kg ha⁻¹, had 57% whole grain milling yield, and 229 g kg⁻¹ amylose. Brown rice length was 7.8 mm, and 1000 kernel weight was 22.7 grams. Indica-15 was 11 days earlier than its parent.

Thus the two early flowering mutants were 9 and 26 days later than the Francis check, were 8 and 18 cm taller, were competitive in yield and amylose content, but had lower whole grain milling yield. Brown rice grain length was longer and kernel weight was heavier than the check cultivar.

No viruses are known to be present in these germplasms.

Germplasm amounts of seed (5 grams) of the above lines may be obtained by writing to: J. Neil Rutger, Dale Bumpers National Rice Research Center, USDA-ARS, P.O. Box 1090, Stuttgart, AR 72160. Requests from outside the US must be accompanied by an import permit. Seed also will be placed in the National Small Grains Collection, USDA-ARS, 1691 South 2700 West, Aberdeen, ID 83210, where it is available for research purposes, including development and commercialization of new cultivars. If this germplasm contributes to the development of new cultivars it is requested that appropriate recognition be given to the source.


Deputy Administrator, Crop Production and Protection
Agricultural Research Service, U.S. Department of Agriculture

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